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Silicon carbide as platform for energy applications

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ABSTRACT

Silicon carbide is emerging as a novel material for a range of energy and environmental technologies. Previously, silicon carbide was considered as a material mainly for transistor applications. We have initiated the use of silicon carbide material towards optoelectronics in general lighting and solar cells, and further pursue concepts in materials for thermoelectrics, biofuel cells and supercapacitor research proposals. In fact, there are a number of energy applications which can be based on the SiC materials.

- Fluorescent SiC for white LED in general lighting
- Cubic SiC for a highly efficient solar cell
- Cubic SiC for water splitting to generate hydrogen

Further on, we have the following concepts that could be explored

- Thermoelectric SiC for electricity generation from heat
- Biofuels cells based on carbon electrodes on SiC
- Supercapacitors based on sintered SiC and carbon materials

Common to these SiC applications is the knowhow in growth technology based on SiC processes using the sublimation based method. We will give an overview of this new research field and outline the energy applications that could be addressed in a near future.

Keywords: silicon carbide; energy materials; optoelectronics; solar cells; LEDs

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